THE IMPACT OF RESIDENTAIL BUILDING CODES ON ENERGY CONSUMPTION IN GEORGETOWN, TEXAS

A Thesis

by

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Submitted to the Office of Graduate and Professional Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

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May 2016

Major Subject: Construction Management

ABSTRACT

This thesis addresses the construction industry and the impact residential building codes have on energy consumption on homes in Georgetown, Texas. This study explores the subject of energy conservation through the analysis of four separate residential building codes adopted by The City of Georgetown. This study investigates each separate building code through the analysis of electrical billing data for single family homes. This research is conducted with the intent to identify and quantify the impact residential building codes have on electrical energy consumption. A list of 400 homes was first broken into categories based on size and date of construction using the Williamson Central Appraisal District and www.realtor.com. The electrical data was then obtained from Georgetown Utility Systems for each home. Analysis of the data revealed significant energy savings, with the largest savings being 35%.

DEDICATION

In loving memory of Arron Trevor Lopez, whom will live forever in our hearts and memories. We all love and miss you very much and know you are watching over us.

ACKNOWLEDGEMENTS

I would like to thank my parents Fay Tenorio, Mercedes Lopez, and step-father Charlie. Without their continuous support, I would not have achieved the things I have. Thanks also, to my girlfriend Diegany for supporting me all through my undergrad and graduate career, I could not have done it without you. Thanks to my siblings Sefra, Mercedes, Merisa, and Arron. You each motivated me in very different ways to work hard in order obtain my masters. Lastly, I would like to thank my grandparents, especially my grandfather Marshall. You motivated me from a very early age to work hard in school. The amount of pride you had in me was always pushing me to finish my education at Texas A&M University. I love each and every one of you and could not have done it alone.

NOMENCLATURE

IRC	International Residential Code
IECC	International Energy Conservation Code
BIM	Building Information Modeling
PV-PCM	Photovoltaic Phase Change Material
PCM	Phase Change Material
HIRL	Home Innovation Research Labs
SSBC	Southern Standard Building Code
CABO	Council of American Building Officials
KWH	Kilowatt-hour

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CHAPTER I

INTRODUCTION AND POTENTIAL BENEFITS

Introduction

Energy is a commodity that is highly valued in many areas of the world. As the population throughout the United States rapidly grows, the number of homes needing to be constructed every year increases with it. According to the United States Energy Information Administration, homes accounted for roughly 21% of the total energy consumption throughout the country in 2013. (United States Energy Information Administration [USEIA], 2014) If homes throughout the country implemented a few energy conservation strategies, the savings could be very substantial. Meyers, Williams, and Matthews (2009) found that the main problem is, homeowners cannot be expected to make substantial investments if the benefits are not short-term. Local governments however, can directly impact the amount of energy consumption through the adoption and enforcement of building codes. Through more stringent codes, homebuilders are required to implement energy saving materials and methods, and this in turn provides long term energy savings. The researcher hypothesized that homes built to newer more stringent codes would demonstrate a significantly lower consumption of electricity.

Significance of the Study

This study is significant as it will compare the energy consumption of homes built during different code periods to quantify the reduced energy usage of newer homes built to more stringent standards. Through the study the amount of energy consumed will be broken down into time intervals and housing properties. With smart meter data going as far back as 20 years, the number of building codes to be tested could be numerous and demonstrate the degree to which each effected the energy consumption. If specific building codes are shown to provide substantial savings, then they could even be enforced on a larger scale to have an even greater effect.

Research Questions

Research questions give the researcher goals to investigate and work towards. The research questions can also be used during the study as a guideline to develop steps for the research process. The research questions developed for this study are:

1. What is the relationship between more stringent energy codes and energy consumption in homes?
2. Since the adoption of more stringent energy codes, what change in energy use and thus cost has occurred for homes in Georgetown, Texas?
3. Which building code caused the largest variance in energy consumption for homes?

Delimitations

Delimitations were imposed on the study to further refine the accuracy of the study. The delimitations also help to eliminate possible errors during the data collection and analysis process. The delimitations imposed on the study were:

1. The size of homes in the sample was roughly delimited to a square footage of 1600 – 2000 square footage in order to increase accuracy between the homes compared.

2. The year the houses were constructed was limited to homes built between 1991 and 2013.
3. Energy usage was based on monthly energy consumption for individual homes over the course of a 2014.
4. Any house that has been remodeled was not included in the study.

Assumptions

The assumptions that were developed during this study were:

1. Houses have been built according to the building code in effect at the time of construction.
2. Energy usage recorded is assumed to be accurate.
3. The homes were built in the correct manner.
4. Materials that were used in the construction of the homes were of sufficient quality.
5. The city inspectors enforced the building codes uniformly on all homes in Georgetown.
6. Each home has been built to the minimal standards required by the building code.
7. No errors occurred while transcribing the data from the source to the analysis table.
8. The Williamson County Appraisal District has the most up to date data on the valuation, square footage, and home renovation data.

Benefits

This study can potentially be beneficial for many cities of similar size and geographic location. If the study shows significant savings in electrical energy consumption, other cities of the same relative size could possibly adopt newer building codes as well. The energy savings could be substantial depending on when the city last updated the building code requirements. The city would also need to be located in an area in which experiences the same relative weather. If the weather varies significantly from what occurs in Georgetown, Texas, the results could vary from what is represented in this study.

CHAPTER II

LITERATURE REVIEW

The literature regarding homes and the various approaches to examine their energy consumption are numerous, and help to display the evolution of energy consumption in homes. Jacobsen and Kotchen (2013) conducted a study in which they focused on how actual energy code changes translate to actual energy consumption. First, Jacobsen and Kotchen (2013) considered the changes made by the Florida Building Commission in the 2001 Building Code. The energy efficient code was performance based, and was enforced through a point system with respect to a baseline model home. Three major changes were identified in the building code that would have the most influence on energy consumption. First, Florida now required that all homes in Central and South Florida have an electric heat pump instead of the older electric strip resistance system. Second, the baseline air distribution system was changed from "leak free" system to a "leaky". This meant that homes could now gain points to obtain a building permit for having a leak- free system. The last significant change was the solar heat gain coefficient changing from .61 to .4 for the windows of the baseline home.

The utility data was then retrieved from the city of Gainsville, Florida. From the utility data, they were able to limit the research to a desired square footage, roof type, air conditioning, and year of construction. After running tests on the data, Jacobsen and Kotchen were able to determine that there was a 6.4% reduction in consumption in natural gas. Electricity saw reductions between 4% and 8% during the hotter months.

This study is the only one found that conducted a study very similar to the proposed research. The building code of evaluation was the 2001 Florida Building Code. The 2001 Florida Building Code will have codes of similar stringency in regards to energy efficiency, but should have many differences from the building code used by Georgetown.

Windows and the solar heat gain were also examined in a study by Cooperman, Dieckman, and Brodrick (2011). Windows can drastically affect the amount of energy consumption for a home. This study closely examined the effects of retrofitting older residence's windows to a near leak-free seal. The air leakage around the windows was a result of improper installation. Dieckman and Brodrick (2011) found that common homes have 0.5 ach leakage while better sealed homes have 0.1 ach leakage. The envelope of the home was also retrofitted with more modern insulation in the walls and roof. They found that the most convenient and effective retrofit was to add spray insulation into the wall cavities. The insulation used could be cellulose, fiberglass, or polyurethane in order to achieve an R-Value of 5, 9, or 10.

The roof was also an item selected to be retrofitted in this study. A PV-PCM roof was used to retrofit the roof. The PCM was installed to act as a heat absorption material and reduce the cooling and heating load for the house. After retrofitting homes, it was discovered that an energy savings of 40% could be achieved. This study provides information regarding the effects of installing better sealed windows, more effective wall insulation, and roofing material. Each one of the retrofits performed, are common changes that occur when a city updates their building codes.

There was another study conducted by Zhiqiang, Zhai, Abarr, Al-Saadi, and Yate (2014) in which the building envelope was studied closely. The study stated that approximately 59% of residential energy is used in space heating and cooling, 12% goes to space heating, 12% goes to air conditioning and refrigeration, and 29% goes to other electrical needs. They took a close look at PCM and their implementation into the building envelope construction. The study examined thermal energy storage systems broken into the categories of sensible, latent, and chemical energy storage systems. Latent energy storage systems were found to be the most viable of the three due to their unique ability to store a significant amount of energy in a small area. An example of the latent energy systems tested was a system that used microencapsulated paraffin blended with a high density polyethylene and wood mixture. The system helped to reduce the amount of evaporation of the paraffin therefore increasing the heat transfer. The research showed that the system could be possibly used in a heated floor.

With the research conducted in the previous studies regarding building envelope, it is apparent how a change or upgrade of material can save energy. The study's both show energy savings and support the possibility of energy savings through the adoption of newer building codes. The city of Georgetown adopted four different building codes over the course of twenty years, and the chance an energy savings occurs is very likely.

In another study, Raheem, Issa, and Olbina (2012) studied the potential energy savings of the proposed 2012 International Energy Conservation Code (IECC) for residential construction. They compared the 2012 IECC to the Florida Energy Efficiency Building Code (FEEBC). Raheem et al. conducted this examination by using Building

Information Modeling (BIM). The research was done by running computer simulations with BIM to analyze the energy consumption on a model of the home before and after the IECC changes. The results showed that a residence in Miami was capable of saving 13.6% of KWh per year which amounted to roughly $250 to $430 in savings per year. This computer simulation showed the effects building codes could possibly have if enforced. With the change of building codes in Georgetown, energy savings are very likely. Raheem et al. showed what a house should be theoretically saving with a BIM model, and this study will show an ex-post facto analysis of what energy changes occur months after construction has completed.

There is a separate study that used IECC 2003 and IECC 2006 as a standard to base their experimentation. Koirala, Bohara, and Li (2013) estimated the effect of IECC 2003 and IECC 2006 on energy consumption using the American Community Survey 2007. They performed a multi-level analysis in order to avoid bias on the estimation of energy used. Koirala, Bohara, and Li (2013) determined that not all states are the same and devised a multi-level test. The test would examine the economic efficiency of the market conditions that the consumer would face such as energy prices and also look at the economic behavior of the individual. They analyzed data received from the American Community Survey which showed the total energy expenditures, type of energy used, housing characteristics, economic and demographic data, and build date for the homes. From this test they discovered that homes could save roughly 1.8% of electricity and 1.3% of natural gas. This study analyzed the energy benefits on a very large scale. They studied state wide policies, which may not be as stringent due to the fact that they must apply to a large area. Building Codes adopted by cites such as Georgetown become more specific to their area with amendments, and could possibly show a difference in energy consumption. After conducting the research, a further area of research suggested was to perform a cost-benefit analysis in order to get more households to adopt the policies.

Sadineni, France, and Boehm (2011) had done just that in their research over economic feasibility of energy efficient measures in residential buildings. They applied some basic upgrades to homes in the Southwest United States and calculated the payback period. The basic energy upgrades included upgrading the walls R-Value to 17, windows U-Value to .65, Doors R-Value to 7, reducing the effective leakage area to 54.9 F-hr-ft^2/BTU, having an air conditioner SEER 15 rated, and reducing the attic R-Value to 22. Sadineni, France, and Boehm determined that even basic energy efficient upgrades had a payback period of less than 10 years. If the building codes of study have some of the same requirements, a similar energy savings could be produced for the City of Georgetown. This study could show how much energy the long run is actually saving by presenting energy data years after construction.

Research conducted by Suter and Shammin (2013) took a different approach to observe the rate of saving energy through people’s reaction to energy saving methods. They tested how much energy was saved by bringing energy consumption to the attention of the homeowners through incentives and programmable thermostats. Homes were equipped with better roof insulation and programmable thermostats in different areas to isolate the separate factors. Some people were informed of the effort to save energy and ways to achieve energy conservation. Another group was not informed of the test, and the last group was informed and offered financial incentives to save energy. The largest saving was achieved though offering financial incentives. The group of informed individuals achieve substantial savings but not to the same degree as the incentives group. This study displayed how just a few changes to a house could make a difference in energy consumption. Building codes present many changes and upgrades required for homes. Their research helps to show there is even more potential for energy savings after a building code has been adopted and changed many components of a home.

Aroonruengsawat, Auffhammer, and Sanstad (2012) went on to study exactly what kind of impact state building codes could have on residential electricity consumption. In their study they measured the savings of electricity per capita to range from 0.3% to 5% depending on which state was analyzed. Aroonruengsawat, Auffhammer, and Sanstad (2012) found that the main problem was that even if the states created energy saving building codes, enforcing the codes became a problem in many states. From this study one could figure that a way to get the most accurate data from energy saving building codes is to conduct a study in a city that strictly enforces their building code. The building codes in Georgetown are enforced through the building permit office and the required inspections from city officials. The Certificate of Occupancy cannot be obtained until these inspections have been performed. This means that the City of Georgetown could expect to see savings similar to what was discovered in this research.

Aside from building codes, there are other factors in homes that contribute significantly to energy consumption. One major contributor to energy consumption is home appliances. McNeil and Bojda (2012) conducted a study in which they dug deeper into the effectiveness of high energy efficient appliances. In the study, the researchers analyzed appliances that had a lower energy consumption than the baseline set by the United States Department of Energy (USDOE). McNeil and Bojada (2012) studied the cost effectiveness of different appliances including refrigerators, electrical water heaters, gas water heaters, central air conditioning, unit air conditioning, and electric cooktops.

This study produced results showing potential savings of 27% for refrigerators, 17% for room air conditioning, 53% for electric water heaters, 23% for central air conditioning, and 11% for gas water heaters. A significant amount of energy can be saved just from updating appliances to a more energy efficient product. This study presents information that show a gap in building codes set by municipalities. Many building codes cover a minimum air conditioner rating but many other appliances are not accounted for. This can present some errors in the electrical data gathered in many studies of similar nature. This also presents an opportunity in which building codes could further branch out to influence the appliances installed in newly constructed homes.

If an electrical energy savings is observed then this presents another interesting topic regarding the cost to construct the new homes. Home Innovation Research Labs (Home Innovation Research Labs [HIRL], 2015) conducted a study to determine the change in construction cost for a house, after a new building code has been implemented. Home Innovation Research Lab (HIRL, 2015) selected four baseline homes to use for their study. The four distinct model homes were selected because of their similarities to homes in six major metropolitan areas. The four model types were:

- One-story house with slab foundation
- Two-story house with slab foundation
- One-story house with basement foundation
- Two-story house with basement foundation

These four houses of the selected type were constructed under the 2012 International Residential Building Code (IRC). HIRL (2015) determined the average 2,607 square foot cost $246,453 to construct. After the implementation of the 2015 International Residential Building Code, HIRL found 49 building code changes. Some building code changes were found to save money, but the change in building code ultimately had an increase of roughly $10,838. The largest portion of extra cost came from change in the foundation. This demonstrates a negative effect resulting from the adoption of new building codes.

CHAPTER III

RESEARCH PROCESS, FINDINGS, AND CONCLUSION

The purpose of this study was to test evaluate what changes occur in electricity consumption for homes built under different building codes. The data used for this study is strictly quantitative data. The data obtained is the monthly electricity consumption for 400 homes over the course of 2014. The homes used in this study were constructed under the following codes:

1. 1985 Southern Standard Building Code (SSBC) – adopted January 27, 1987
2. 1994 Southern Standard Building Code with appendix C that adopted the 1992 CABO One and Two-Family Dwelling Code, along with the 1993/94 book of amendments – adopted September 12, 1995
3. Amendments to 1992 CABO One and Two-Family Dwelling Code to Adopt and add Energy Conservation Standards – adopted April 27, 1999
4. 2000 International Residential Code – adopted February 26, 2012

The researcher filtered Georgetown homes by their respective building code based on the construction date. If a building code was adopted in 1999, the researcher waited for homes built in the following year to ensure the home was built under the intended building code. The build date used was the date in which the certificate of occupancy was obtained. This practice was performed to ensure that no home being built during the transition of building codes was placed in the wrong category of building code. The homes were also filtered to a similar square footage, all being within 400 square feet of each other. The square footage was a factor that could skew the data if it was not taken into account.

The electrical data was obtained from Georgetown Utility Systems by providing a list of predetermined homes. Georgetown Utility Systems provided a list of data for all homes receiving electrical services from them. From their list, the researcher matched the data with the respective home. The data is broken down into Kilowatt-hour usage per month, average monthly Kilowatt-hour usage, and average Kilowatt-hour usage per square foot. The next step of the study was to run a statistical analysis on the data to test if the difference in energy consumption is statistically significant.

The homes were first broken down into a rough list of 125 homes per building code using the online website www.realator.com. The website was used to filter homes to areas of the city in which were found to most likely receive electricity from Georgetown Utility Systems. Once the rough list was generated, the Williamson County Appraisal District was used to verify the square footage of each home. The Williamson County website allowed for each address to be searched, which aided in verifying all data previously found from www.realator.com. Williamson County Appraisal District was also used to verify that no renovation had been performed on the sample homes. It is possible that a renovation could have occurred without the county's knowledge, but this study was conducted with the assumption that Williamson County Appraisal District had the most up to date records for homes in Georgetown.

CHAPTER IV

ANALYSIS AND RESULTS

The list of 125 homes per building code was narrowed down to a list of 100 homes per building code after eliminating homes with no electrical data from Georgetown Utility Systems. The data was imported into JMP Pro 12 to perform the statistical analysis on the data. The first test was performed with the following hypothesis:

$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4 \qquad\qquad H_a: \mu_1 \neq at\ least\ one\ other\ \mu$

In the developed hypothesis μ is the average monthly energy consumption for the homes in a selected building code. The test was conducted with 95% certainty. In order to test the hypothesis an ANOVA test (A-1) was conducted to produce the means for the four separate groups of data. The means for the groups were then compared to each other by conducting a Tukey HSD analysis. The initial findings showed the four groups fell into a series of three different groups (A-8). Group A contained the 1985 Southern Standard Building Code with a mean separate from the other three building codes. Group B contained 1994 Southern Standard Building Code containing the 1992 CABO one and two family dwelling code. The amendments to the 1992 CABO one and two family dwelling code to add energy conservation standards also fell in group B as well as its predecessor. Since both building codes fell under Group B, the test found that the two did not have significantly different average monthly energy consumption. Group C contained the 2000 IRC with a mean separate from the other three building codes.

After analysis, it was found that were outliers to the data. In order to test the normality of the data we tested for unequal variances. The Brown-Forsythe value showed that the data was not normalized (A-3). In an effort to normalize the data the log of the data was taken and unequal variances were again tested. The Brown-Forsythe value improved (A-4) but the data was still shown to be skewed. (A-7) Since the data was still skewed a non-parametric test was performed on the log of the data. A Kruskall Wallis test was performed with the log data and the results were the same as the parametric test, Tukey HSD. There were three groups with significantly different means in their average monthly electrical consumption. The four building codes were compared to each code and tested to see if there was a significant change between codes (A-6).

The results from the statistical analysis showed a significant savings in energy over the time new building codes were adopted. The largest savings comes from a comparison of the 1985 Southern Standard Building Code and the 2000 IRC. The average monthly electrical consumption for the 1985 Sothern Standard Building Code was 983 kWh. There was a difference of 347 kWh between their average monthly electricity consumption. This results in an electrical savings of roughly 35%. The next largest savings occurs in a comparison between the 1994 Southern Standard Building Code with the 1992 CABO energy amendments and the 2001 IRC. The 1994 Southern Standard Building Code with the 1992 CABO energy amendments had an average monthly consumption of 853 kWh. Their difference in monthly average electricity consumption is roughly 198 kWh. The difference in average monthly electricity consumption results in a savings of roughly 23%.

CHAPTER V

CONCLUSION

The study showed that there was a progressive savings as newer building codes were adopted by The City of Georgetown. There was only one change in building code that did not result in a significant savings of electricity consumption in Georgetown homes. The 1994 Southern Standard Building Code containing appendix C with the 1992 CABO one and two family dwelling code did not have a significant savings after the adoption of amendments to 1992 CABO to add energy conservation standards. The savings were substantial when comparing the oldest building code to the newest building code. The comparison resulted in an average monthly savings of 35% for the year of 2014. This study demonstrates an effective method to saving energy for an entire city with the adoption of more stringent building codes. There is a great opportunity for any city of similar size and geographic location with out of date building codes to save electrical energy. The electrical savings will provide an incentive for municipalities to adopt new codes.

There are many areas that could be further researched. The amount of energy saved is also based on the geographic location of Georgetown. The savings could be very different depending on where the study is conducted. Georgetown, Texas is a predominantly hot and humid environment. The results could vary if the study was conducted in a colder more arid region. Another area of interest is the amount of influence home appliances have on the energy consumption of the home. If the researcher could find a way to eliminate significant variables such as in home appliances, this would eliminate another possible factor of error. Now that evidence of energy conservation due to the adoption of newer building has been presented, the research could be helpful in possible commercial buildings. If municipalities have older commercial building codes there could be a possible savings with the adoption of newer codes. The building codes themselves could also become a subject of study. The codes that create the largest savings are a topic that could find the key contributors to energy savings.

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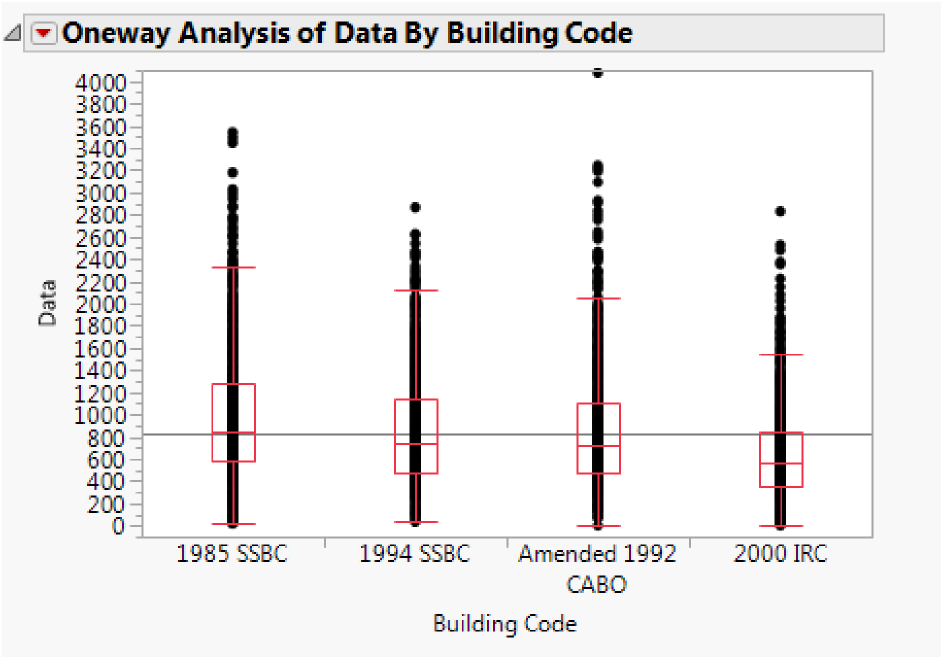
APPENDIX A

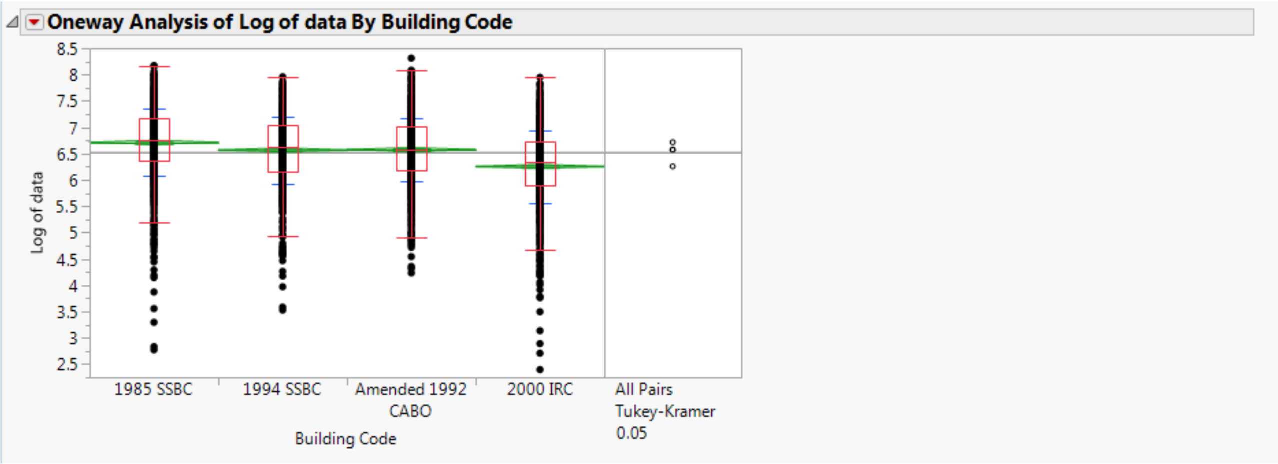
A-1

ANOVA boxplot of original data



A-2

ANOVA boxplot of log data



A-3

Brown-Forsythe P-value for original data

Test	F Ratio	DFNum	DFDen	Prob > F
O'Brien[.5]	23.2964	3	4796	<.0001*
Brown-Forsythe	34.6427	3	4796	<.0001*
Levene	45.7720	3	4796	<.0001*
Bartlett	56.9492	3	.	<.0001*

A-4

Brown-Forsythe P-value for log data

Test	F Ratio	DFNum	DFDen	Prob > F
O'Brien[.5]	3.1919	3	4794	0.0226*
Brown-Forsythe	1.7703	3	4794	0.1506
Levene	1.9911	3	4794	0.1131
Bartlett	7.0941	3	.	<.0001*

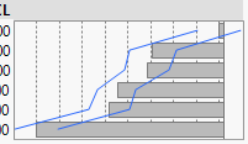
A-5

Kruskal Wallis test comparison of original data

Nonparametric Comparisons For Each Pair Using Wilcoxon Method

q*	Alpha
1.95996	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
Amended 1992 CABO	1994 SSBC	-14.083	28.29014	-0.4978	0.6186	-8.000	-42.000	25.000
1994 SSBC	1985 SSBC	-169.416	28.29015	-5.9885	<.0001*	-113.000	-149.000	-76.000
Amended 1992 CABO	1985 SSBC	-188.008	28.29014	-6.6457	<.0001*	-121.000	-157.000	-86.000
2000 IRC	Amended 1992 CABO	-317.278	28.29014	-11.2152	<.0001*	-168.000	-198.000	-138.000
2000 IRC	1994 SSBC	-323.537	28.29014	-11.4364	<.0001*	-180.000	-212.000	-149.000
2000 IRC	1985 SSBC	-487.894	28.29014	-17.2461	<.0001*	-295.000	-328.000	-261.000



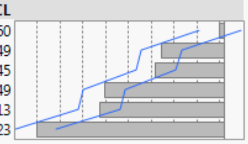
A-6

Kruskal Wallis test comparison of log data

Nonparametric Comparisons For Each Pair Using Wilcoxon Method

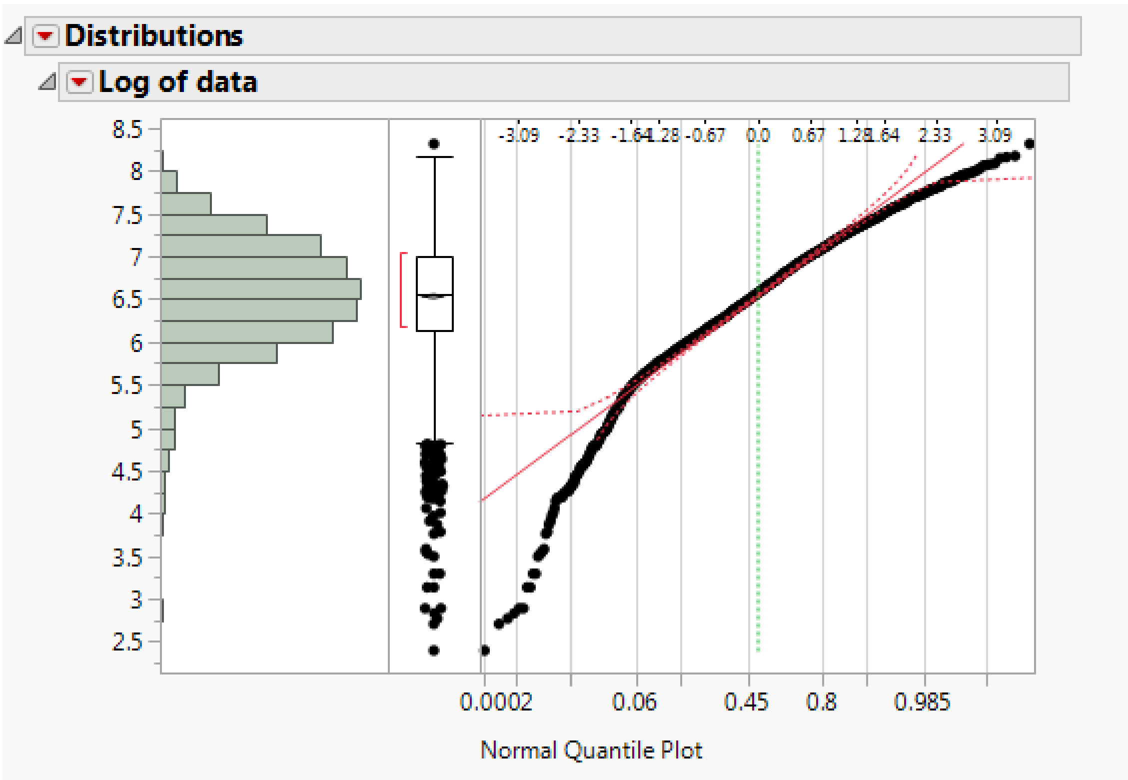
q*	Alpha
1.95996	0.05

Level	- Level	Score Mean Difference	Std Err Dif	Z	p-Value	Hodges-Lehmann	Lower CL	Upper CL
Amended 1992 CABO	1994 SSBC	-13.089	28.28425	-0.4628	0.6435	-0.011516	-0.060625	0.038160
1994 SSBC	1985 SSBC	-169.416	28.29015	-5.9885	<.0001*	-0.150626	-0.199343	-0.101549
Amended 1992 CABO	1985 SSBC	-187.086	28.28425	-6.6145	<.0001*	-0.163453	-0.211538	-0.115445
2000 IRC	Amended 1992 CABO	-317.543	28.27835	-11.2292	<.0001*	-0.285815	-0.335712	-0.236749
2000 IRC	1994 SSBC	-322.671	28.28425	-11.4082	<.0001*	-0.298128	-0.348417	-0.248113
2000 IRC	1985 SSBC	-487.097	28.28425	-17.2215	<.0001*	-0.448950	-0.497220	-0.400223



A-7

Distribution of log data showing skewed data



A-8

Tukey HSD test for original data

Positive values show pairs of means that are significantly different.

Connecting Letters Report

Level				Mean
1985 SSBC	A			983.47167
1994 SSBC		B		854.09250
Amended 1992 CABO		B		853.83833
2000 IRC			C	635.64250

Levels not connected by same letter are significantly different.

Ordered Differences Report

Level	- Level	Difference	Std Err Dif	Lower CL	Upper CL	p-Value
1985 SSBC	2000 IRC	347.8292	20.07748	296.231	399.4269	<.0001*
1994 SSBC	2000 IRC	218.4500	20.07748	166.852	270.0478	<.0001*
Amended 1992 CABO	2000 IRC	218.1958	20.07748	166.598	269.7936	<.0001*
1985 SSBC	Amended 1992 CABO	129.6333	20.07748	78.036	181.2311	<.0001*
1985 SSBC	1994 SSBC	129.3792	20.07748	77.781	180.9769	<.0001*
1994 SSBC	Amended 1992 CABO	0.2542	20.07748	-51.344	51.8519	1.0000